Name:

at1118paper: Complete the Square (v413)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 30x = -209$$

Add $\left(\frac{-30}{2}\right)^2$, which equals 225, to both sides of the equation.

$$x^2 - 30x + 225 = 16$$

Factor the left side.

$$(x - 15)^2 = 16$$

Undo the squaring. We need to consider both $\pm\sqrt{16}$.

$$x - 15 = -4 \quad \text{or} \quad x - 15 = 4$$
$$x = 11 \quad \text{or} \quad x = 19$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 - 38x = 215$$

$$x^2 - 38x + 361 = 576$$
$$(x - 19)^2 = 576$$
$$x - 19 = \pm 24$$
$$x = -5 \quad \text{or} \quad x = 43$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 + 36x = 1792$$

$$x^2 + 36x + 324 = 2116$$
$$(x + 18)^2 = 2116$$
$$x + 18 = \pm 46$$
$$x = -64 \quad \text{or} \quad x = 28$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 - 34x = 1475$$

$$x^2 - 34x + 289 = 1764$$
$$(x - 17)^2 = 1764$$
$$x - 17 = \pm 42$$
$$x = -25 \quad \text{or} \quad x = 59$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 + 32x = -247$$

$$x^2 + 32x + 256 = 9$$
$$(x + 16)^2 = 9$$
$$x + 16 = \pm 3$$
$$x = -19 \quad \text{or} \quad x = -13$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 - 10x = 144$$

$$x^2 - 10x + 25 = 169$$
$$(x - 5)^2 = 169$$
$$x - 5 = \pm 13$$
$$x = -8 \quad \text{or} \quad x = 18$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 + 50x = 336$$

$$x^2 + 50x + 625 = 961$$
$$(x + 25)^2 = 961$$
$$x + 25 = \pm 31$$
$$x = -56 \quad \text{or} \quad x = 6$$